COMPARISON OF MICROPROBE TWO-STEP LASER DESORPTION/LASER IONIZATION MASS SPECTROMETRY AND GAS CHROMOTOGRAPHY MASS SPECTROMETRY FOR THE ANALYSIS OF ANCIENT ROCKS.

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Microprobe two-step laser desorption/laser ionization mass spectrometry (L^{2}MS) and gas chromatography/mass spectrometry (GC/MS) were used to analyze polycyclic aromatic hydrocarbons (PAHs) in ancient terrestrial rocks. L^{2}MS provides an *in situ* analysis of very small samples, records the PAHs with no isomer information, and gives qualitative data on the degree of alkylation of a given PAH series over the complete mass range. It has been used for the analysis of extra-terrestrial material because of these benefits. GC/MS provides isomer separation and quantitation of PAHs in the soluble organic matter (bitumen) but not the insoluble organic matter (kerogen), and is limited by sample size. GC/MS is a common technique in the analysis of oil and bitumen in terrestrial rocks.

We have analysed a series of samples that are well characterised geochemically to provide a comparison between each technique. This has allowed us to understand the benefits and potential drawbacks of each technique. Combination of these techniques allows analysis of very small samples by L^{2}MS with GC/MS confirmation of isomer distributions.

It was found that the concentration of bitumen within the rock samples affects the PAH alkylation signal for L^{2}MS. At low bitumen concentrations, L^{2}MS can produce pyrolysis products from the kerogen present; however, as bitumen concentrations increase, the PAH distribution from the bitumen dominates the signal.